SCIENCE

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A NEW PHASE OF UNIVERSITY EXTENSION.

JUST at the present critical stage of the American movement for extension teaching the practical pedagogy of this imported phase of educational activity is up for sharp and earnest discussion. It is agreed that however properly the system may have been been reared in England, American methods must be applied to its life if it is to become a recognized force in American education. The naturalization of University Extension must therefore pre-eminently mean its further organization toward useful ends.

The recent article of Professor Willis Boughton on "Graded Work in Philadelphia," strikes the key-note for an earnest and scientific discussion, which we hope may be continued until the American society shall have nurtured extension teaching into one of the most vital forms of educational activity. Professor Boughton has outlined the plan for graded work to be pursued at certain centres, and has, moreover, called attention to the division of the Philadelphia work into "departments," although a thorough organization of these "departments" has not as yet been distinctly mooted. It is also here pertinent to note that the president of the American society, Dr. Edmund J. James, has in Philadelphia introduced the excellent plan of faculty meetings of the lecturers, with the view of eliciting the practical pedagogics of the subject.

As an attempt to continue a discussion looking toward efficient organization of university extension, the writer presents for candid criticism the following somewhat comprehensive suggestions. Stated with almost dogmatic brevity, the scheme is submitted, none the less, in the scientific spirit, and expects no other mark of favor than that derived from its accordance with the experienced facts.

The scheme proposes to establish in each great university centre extension faculties and sub-faculties of the various departments of knowledge for the development of real class-work and individual study, alongside the present lecture system. Each faculty shall in itself form a complete organization, with officers of good executive talent and broad sympathies. The presidents of the faculties, together with the president of the centre, shall form a body advisory to the executive committee of the centre.

It shall be the duty of each president, in concert with his faculty, to develop the best methods of exciting popular interest in the special subjects, and especially to determine upon the pedagogic methods best adapted to the particular subjects and to the various grades of students seeking the extension classes.

Each faculty shall, as far as practicable, arrange for class instruction continuing during eight or nine months of the year, or at any rate for courses of sufficient length to meet some tangible purpose.

Each faculty, and finally each professor, shall aim to carry along the individual in his work, rather than aim to present finely-wrought lectures — the latter being used as accessory only to the main purpose.

Inasmuch as such proposed instruction would of necessity be more expensive and demand a closer relation between the professor and the student than the present methods of extension organization seem to encourage, it would seem desirable that these special extension classes be sharply distinguished from the general extension classes. The latter are and should be open to all members, but the former only to such members as meet the terms for the special tuition, and are willing to engage in regular student work.

It would also seem proper that the tuition for each special class course should, to some extent, depend upon the number of students applying, as well as upon the nature of the subject developed.

The eventual outcome of such scheme of instruction would doubtless be the award of highly-prized certificates of the work done, or what comes to the same, the conferring of degrees, either through the universities or through the extension society itself.

As an application of this scheme of organization to a particular department, let us suppose the mathematical professors, say of the Philadelphia extension course, to be organized as a unit faculty. The courses they should propose would range from algebra, through a goodly variety of applied mathematics, to general, or even practical astronomy. Each course would be carried on in some relation to the other courses. The most cordial co-operation would exist between the several classes and professors, and both students and professors work in one or the other class, as the furtherance of the most efficient work and teaching might demand.

As an example of the method suggested, when carried down to an actual class course, the writer may be permitted to instance a course in the theory and practice of surveying, intended as one element of a school of mathematics recently proposed by him to the Philadelphia Society for University Extension. The course is based on a demand for such instruction coming to him from two classes of students, viz., (1) practical surveyors ill equipped in the mathematics of the subject, and (2) young men, who, although busily engaged during the day in other employments, desire, if possible, to equip themselves for the life of a surveyor or civil engineer. The instruction is to be given in class, by correspondence, and in the field. The class instruction, given one evening each week for eight months, embraces text-book work pursued under direction, and as rapidly as each student is able lectures on instruments, their construction, adjustment, and use, and on methods of field and office work. Correspondence is encouraged for the purpose of eliciting a better knowledge of each man's difficulties. Replies are to be given through the medium of a specially-trained stenographer or in class. Field instruction is necessarily limited to occasional work of Saturday afternoons. Practically every student is also his own class, pursuing his own work, and receiving help according to his individual needs. The method of learning by doing — ever a good one provided it is doing by method — meets also, as thus guided, the requirements of the ungraded mass of students seeking the special knowledge.

The writer would violate the very spirit of his suggestion were he to attempt to show in detail how it might apply to well-organized evening schools of chemistry, or biology, or history. But he ventures to suggest the pedagogic purposes must in these subjects differ *inter se* and from those of mathematics, and that here the chemical laboratory, the museum of natural history, and the seminar method might find interesting and useful extension.

A fair appreciation of the occasion for the above suggestions requires a concise statement of some of the assumptions made in reference to the aims and ends of university extension. It has been assumed that the final aim is to bring as much of each subject attempted, to each individual student, as the nature of the subject, the time, and the capacity of the individual student may warrant.

It has been assumed that the extension society, as the popular representative of the university, is jealously alive to the danger of indirectly promulgating false conceptions concerning the higher education, of placing mental intoxication on the same plane with mental work, or of discrediting university training, either by unsuitable methods of popular instruction, or by appearing to give all of the university training in twelve easy evening lessons.

It has been assumed that there is a popular demand, active or latent, for highly specialized information fully up to date, and

such as it is alone the province of the specialist of the university to collect and promulgate.

Finally it has been assumed that as nothing save advantage can come to those seeking the special knowledge, whether for use or culture, so nothing save advantage can accrue to the university extension system or to the university itself from the adoption of a scheme of evening instruction fairly suited to the needs of the individual student.

M. B. SNYDER.

NOTES AND NEWS.

IT will interest cremationists to hear that the Japanese, who some time ago adopted burial of the dead, in imitation of European nations, have reverted, according to the *Indian Medical Gazette*, to their own custom of burning the dead on account of its sanitary recommendations.

— The death of Dr. F. C. Dietrich, keeper of the Botanical Museum at Berlin, is announced. He was eighty-six years of age.

— A despatch to the New York *Tribune*, from Franklin, Ind., Dec. 26, states that Professor Gorby, State Geologist, has given his collection to Franklin College. The collection consists of 40,000 to 60 000 specimens, gathered from almost every State in the Union, and from many foreign countries.

— At the Dec. 10 meeting of the Royal Society, according to *Nature*, the president read from the chair a letter from Professor Dewar, which had been put into his hand as he entered the meeting-room, in which Professor Dewar stated that he had at 3 P.M. that afternoon "placed a quantity of liquid oxygen in the state of rapid ebullition in air (and therefore at a temperature of — 181° C.) between the poles of the historic Faraday magnet in a cup-shaped piece of rock salt (which is not moistened by liquid oxygen and therefore keeps it in the spheroidal state)," and to his surprise, Professor Dewar saw the liquid oxygen, as soon as the magnet was stimulated, "suddenly leap up to the poles and remain there permanently attracted until it evaporated."

— The educated classes of Italy are delighted with the proposed changes at the ancient University of Bologna. The commission appointed by the Government to consider the advisability of making reforms in the old institution has recommended the adoption of the plans of Signor Buriani, the well-known engineer. The cost of the new buildings, which will be an ornament to the city, is estimated at 5,000,000 lire. The philosophical and legal faculties will be housed in future in the old "Archiginnasio," while the School of Mines will occupy the present university building on the Via Zamboni. The library united with the royal and city libraries will be placed in a new palace. Great improvements will be made also in the School of Medicine, which in recent years has suffered somewhat in reputation. The University of Bologna has as grand traditions as any university in the world, and college men in all countries feel an interest in its welfare. It is, in many ways, the mother of universities, and had centuries ago 12,000 students.

— Dr. Langer, says *The Medical Record*, has been investigating the subject of suicide among the soldiers in European armies, his statistics including the years from 1875 to 1887. The largest number of suicides occurred in the Austrian army, averaging 122 a year in each 10,000 soldiers. Next to Austria is Germany, which averaged 63 suicides to every 10,000 soldiers. In the Italian army on the average 40 soldiers in every 10,000 committed suicide every year. The French army from 1872 to 1889 lost in Europe 29 soldiers to every 10,000 annually, and in Algeria it lost just twice as many by suicide. In Belgium there occurred 21, in England 23, in Russia 20, and in Spain 14 to every 10,000. The cause of suicide in the army appears in most cases to be the fear of punishment, though not a few are driven to the act through aversion to military service and despair of ever being able to return to civil life.

— In a paper, read before the Sanitary Convention at Vicksburg, the proceedings of which are published, Dr. Baker of the Michigan State Board of Health gave official statistics and evidence which he summarized as follows: "The record of the great saving of human life and health in Michigan in recent years is one to which, it seems to me, the State and local boards of health in Michigan can justly 'point with pride.' It is a record of the saving of over one hundred lives per year from small-pox, four hundred lives per year saved from death by scarlet fever, and nearly six hundred lives per year saved from death by diphtheria — an aggregate of eleven hundred lives per year, or three lives per day saved from these three diseases. This is a record which we ask to have examined, and which we are willing to have compared with that of the man who 'made two blades of grass grow where only one grew before.'"

— A recent press dispatch states that Superintendent Johnson of the Deaf and Dumb Institute at Indianapolis has been making experiments with the phonograph, and believes that in connection with it he can teach the majority of the deaf-mutes under his charge to talk. He finds that the instrument concentrates the sound at the drum of the ear in such a way that many of the pupils otherwise deaf are enabled to hear. He intends to carry the experiments further, and thinks the phonograph may become a means of teaching the use of their voices to some mutes whose inability to speak is due to the fact that they have never heard speech. He tried the phonograph with 27 boys and 29 girls. Of these, only 3 girls were unable to hear something. Twenty boys and girls could hear instrumental music, while 11 boys and 15 girls could distinguish spoken words. Of the 56 whose hearing was tested, 28 could hear better with the left ear and 14 with the right, while 11 heard alike in both.

— It is much to be feared that, after all the stir which has been made about it, the Antarctic expedition which was to have been sent out next year, at the joint expense of the Australian colonies and Baron Oscar Dickson of Gothenburg, may have to be dropped owing to the supineness of the Australians. In July last it was announced that the Queensland Government was to place £2,000 in the colonial estimates as a contribution to the expedition. Sir Henry Parkes undertook to get £2,000 from New South Wales, while from Victoria a sum was expected commensurate with the importance of that colony. Sir Thomas Elder also promised £5,000 on certain conditions, while Baron Oscar Dickson undertook to give another £5,000, and, indeed, was quite prepared to spend double that amount to insure that the expedition should be a success. What with cash and promises, the sum of £14 000 seemed secure in July last, and it was confidently expected that £2,000 should be raised, so as to be well over the £15,000 which it was calculated the expedition would cost. Baron Nordenskjold was quite prepared to take charge of the expedition; and, as stated in the London *Times*. Baron Dickson had actually selected the two ships which he thought suitable for the work. Now we learn that the Queensland Parliament has refused to pass the vote of £2,000 which was placed upon the estimates. It is not only the direct loss of this subscription which is to be deplored, but it affects the other promises, which were made conditionally. Baron Dickson's offer of £5,000 lapses at the end of this month, and as he has had no information from Australia that the remainder of the £15,000 is secured, he has probably made up his mind that the whole scheme has fallen through, as did the similar proposal a few years ago. Indeed, it would seem as if Baron Dickson had not been treated with the courtesy which might have been expected. He had not been informed of the progress of matters in Australia, and has received no certain information as to the actual state of the movement. The fact is, the movement seemes to have been sadly mismanaged. No proper steps have been taken to enlist the sympathies and the active support of the public in Australia, where there is plenty of money to spare for purposes of this kind. True, one or two newspapers appear to have supported the proposal with some energy, but much more is wanted than that in Australia, where evidently the public is not too enthusiastic for the promotion of knowledge. The leaders of the movement on behalf of the proposed Antarctic expedition seem to have been a few members of learned societies, not quite in touch with the general public. The result is that the wealthy Australian colonies have been placed in the ridiculous position of having appealed to a small nation like Sweden for assistance, and in the end have

been unable to fulfil the conditions on which that assistance was asked. It is to be hoped that it is not yet too late to lead the movement to a more worthy result.

— The *Telegram Herald* of Grand Rapids says that the tallest men of Western Europe are found in Catalonia, Spain; Normandy, France; Yorkshire, England; and the Ardennes districts of Belgium. Prussia gets her tallest recruits from Schleswig-Holstein, the original home of the irrepressible Anglo-Saxons; Austria from the Tyrolese highlands. In Italy the progress of physical degeneration has extended to the upper Appennines, but the Albanian Turks are still an athletic race, and the natives of the Caucasus are as sinewy and gaunt as in the days of the Argonauts. In the United States the thirty-eighth parallel, ranging through Indiana and northern Kentucky, is as decidedly the latitude of big men as the forty-second is that of big cities. The tallest men of South America are found in the western provinces of the Argentine Republic, of Asia in Afghanistan and Kaypooana, of Africa in the highlands of Abyssinia.

— A correspondent of the *Times of India*, referring to recent long fasts in this country, says that in India fasts of thirty to forty days are common among the Jains, from among whom, once in each year, some individual comes forward and undertakes to fast thirty-five, forty, and even sixty days. They do this with nothing but warm water to drink, and will die rather than take food during the prescribed period. Quite recently two Jains of Bombay fasted, one for sixty-one, the other for forty-eight days, at the end of which time, having been congratulated by twenty-five thousand Jains who went for the purpose, they recommenced taking food in the manner prescribed in their own books and shastras. On Sept. 22, in commemoration of this event, all the chief bazaars in Bombay were closed, and about five thousand Jains, male and female, fasted all day, while a large sum was spent in securing the release of cows and other animals from the slaughter house at Bandora.

— At a meeting of the Chemical Society of Washington, Dec. 10, Professor Wiley and W. H. Krug presented papers on the "So-called Floridite." Professor Wiley described the location and the occurrence in Florida of the samples which had been sent him by Professor Cox. Some of the specimens, he said, were amorphous masses of almost pure tri-calcium phosphate, others were mixtures, but containing chiefly that compound. He thought it ought not to be defined as a mineral species. He said undue importance had probably been ascribed to commercial fertilizers as plant foods, as experience has demonstrated that mineral phosphates are not readily absorbed by plants even when in a finely divided state, but need to be decomposed by the action of sulphuric acid. The most refractory phosphates, however, with plenty of time are utilized by the plants. Florida phosphates seemed especially capable of assimilation in the natural state, and experiments in the use of the natural product were now going on at the sugar station of Runymede, Florida. Mr. Krug spoke of the methods of analysis, gave details of the process as described at a previous meeting, and presented the results of the analyses (Dr. T. M. Chatard, "Notes on the Analyses of phosphate rocks"). He agreed with Professor Wiley as to the non-existence of floridite as a definite species. His paper referred mainly to the determination of fluorine in phosphate rocks, and the method employed is a modification of the Boezelius silica fusion method. Instead of using ammonium carbonate to remove silica and alumina from the alkaline solution, the saturation of the solution with carbonic acid under pressure has been found to give very satisfactory results. He had reason to think that the method might be still further simplified. Discussion of the two papers was by Professor Clarke and Dr. Schneider. Professor Clarke thought the determination of a mineral species did not depend upon crystallization, as many amorphous minerals, such as torquois, serpentine, and talc were good species Whether it is a distinct chemical compound, is the best basis of determination. If among the phosphates is found a tri-calcium phosphate by itself, he thought it ought to be a mineral species, no matter what its derivation. Dr. Schneider described a series of analyses he had made to determine the influence of different quantities of fluorine on the loss of silica when evaporated with varying amounts of liquid. In a paper on "Meat Preservatives," I. T. Davis gave the following list of preservative agents: salt, potassium nitrate, sulphurous acid, benzoic acid, saccharine, salycilic acid, hydro-napthole. The author described their action and the means of their detection. W. F. Hillebrand and Wm. H. Melville presented a paper "On the Isomorphism and Composition of Thorium and Uranous Sulphates."

— A meeting was held in the Lecture Room of the Brooklyn Institute, 502 Fulton Street, on Saturday evening, Dec. 26, at eight o'clock, for the purpose of organizing a Brooklyn Numismatical Society as a Section of the Brooklyn Institute. The purposes of the society will be the collection of coins, medallions, and kindred works of art, the conduct of courses of lectures on numismatics, the formation of a library of reference on the subject, and to enable students and specialists in numismatology to become better acquainted with one another. Dr. Charles E. West, president of the Archæological Society of the Institute, gave a brief illustrated lecture on "Ancient Coinage" after the organization of the section.

— In the interesting paper on insectivorous plants, read before the Royal Horticultural Society on Sept. 22, 1891, and reported in *Nature*, Mr. R. Lindsay refers to the experiments by which Mr. Francis Darwin has shown the amount of benefit accruing to insectivorous plants from nitrogenous food. Mr. Lindsay says his own experience in the culture of Dionæa is that when two sets of plants are grown side by side under the same conditions in every respect, except that insects are excluded from the one and admitted to the other, the latter, or fed plants, are found to be stronger and far superior to the former during the following season. He points out the importance of remembering that the natural conditions under which these plants are found are different from what they are under cultivation. In their native habitats they grow in very poor soil and make feeble roots, and under these conditions may require to capture more insects by their leaves to make up for their root deficiency. Under culture, however, fairly good roots for the size of plant are developed. "Darwin," says Mr. Lindsay, "mentions that the roots of Dionæa are very small: those of a moderately fine plant which he examined consisted of two branches, about one inch in length, springing from a bulbous enlargement. I have frequently found Dionæa roots six inches in length; but they are deciduous, and I can only conjecture that the roots mentioned by Darwin were not fully grown at the time they were measured. What is here stated of the natural habits of Dionæa applies more or less to all insectivorous plants."

— At a recent meeting of the New York Academy of Medicine a popular address was delivered by Professor Charles F. Chandler on "Arsenic in Common Life." In this address, as reported in *Medical News*, he devoted himself to the task of exploding the widely prevalent idea, both in lay and professional circles, concerning the dangers from arsenic in wall-paper. He said that he had himself believed in it without ever making any special investigation, up to the time when his duties in connection with the Board of Health required him to make it a special study. He then found that the idea had been started by a botanist, and that it was based on the most flimsy reasoning. He next made some experiments in the laboratory by passing air over sheets of paper —some moist and others dry—coated with Paris green. Not a trace of arsenic was found in this air. Much of his address was devoted to a narration of cases that had occurred in Boston during a time when the people in that city were much excited over the supposed dangers from arsenical wall-paper. The most important case was that of an ex-mayor of Boston, who had been supposed to be suffering for a long time from this form of poisoning, but the post-mortem examination showed that he had died from cancer of the stomach. The wall-paper that had been supposed to be the source of the poisoning in his case had not been changed from 1817 to 1891. While it is quite possible that, in the old-fashioned wall-paper, the arsenical dyes were loosely attached to the paper, the arsenic might become detached and diffused through the air, the amount would ordinarily be quite insignificant; and in the wall-papers made in the last fifteen years no arsenical pigments have been used, and the presence of arsenic in

these papers, as determined by delicate chemical tests, is due entirely to accidental impurities. Some of the papers that were thought to have caused poisoning had been on the walls for thirty or forty years. Supposing, for the sake of argument, that there were sixty square yards of paper in a room, each yard containing one grain of arsenic—the amount found in several of the cases quoted—and that during a period of thirty years *all* the arsenic had left the wall-paper and had entered the human system without any being lost, this would be at the rate of one grain in six months, or only $\frac{1}{180}$ of a grain in each twenty-four hours. Many distinguished scientists have independently investigated this subject of poisoning from arsenical wall-paper, and they all agree in saying that there is "nothing in it."

— The *Meteorologische Zeitschrift* for November contains a summary, by Dr. J. Hann, of the meteorological observations taken at Cairo from 1868–88. The observations have been published *in extenso*, together with a good introduction upon the climate, in the Bulletin of the Egyptian Institute, and although similar observations have occasionally been published before, the present series contains much new and useful material. The most striking feature in the climate of this part of Egypt, as we learn from *Nature*, is the *Chamsin*, the hot and dust-bearing wind which makes its appearance in March or April for about three to four days at a time, and robs a large portion of the trees of their leaves. In the intervals during which this wind is not blowing the weather is pleasant and clear during spring-time, and the nights fresh and calm. During the summer the north winds prevail, with high temperature, very clear air, and great dryness. Towards September humidity appears with the rise of the Nile, the ground is at times covered with heavy dew, and the heat becomes oppressive on account of the moisture. In October and November fog occasionally occurs in the morning, and rain begins to fall. After this season the temperature is uniform and pleasant. Snow is unknown, frost very seldom occurs, and rain is not very frequent. The absolute maximum temperature of the 21 years' period was 117° in August, 1881, which was also closely approached in May, 1880, viz., 116.4°. The absolute minimum was 28.4° in February, 1880, and the mean annual temperature was 70.5°. Rainfall is only given for the years 1887–88, in which 0 87 and 1.67 inches fell respectively. The relative humidity sinks at times even on a daily average to 12 per cent, and has been known to fall as low as 3 per cent at certain hours. Thunder-storms and hail are very rare. The original work contains a long investigation on the connection between the height of the Nile and the weather, a comparison between the present climate and that at the beginning of this century, and several carefully prepared diagrams referring to all meteorological elements.

— At the monthly meeting of the Royal Meteorological Society, Dec. 16, Mr. W. Marriott gave the results of the investigation undertaken by the society into the thunder-storms of 1888 and 1889, which he illustrated by a number of lantern slides. The investigation was originally confined to the south-east of England, but as this district was found to be too circumscribed, it became necessary to include the whole of England and Wales. After describing the arrangements for collecting the observations and the methods adopted for their discussion, Mr. Marriott gave statistics showing the number of days on which thunder-storms occurred at each station; the number of days of thunder-storms in each month for the whole country; the number of days on which it was reported that damage or accidents from lightning occurred; and also the number of days on which hail accompanied the thunder-storms. In 1888 there were 113 days and in 1889 123 days on which thunder-storms occurred in some part of the country. The number of days with damage by lightning was 33 in 1888 and 38 in 1889; and there were 56 days in each year on which hail accompanied the thunder-storms. The tables of hourly frequency show that thunder-storms are most frequent between noon and 4 P.M, and least frequent between 1 A.M. and 7 A.M. Thunder-storms appear to travel at an average rate of about 18 miles per hour in ill-defined low barometric pressure systems, but at a higher rate in squally conditions. The author is of opinion that individual thunder-storms do not travel more than about 20 miles; and that they take the path of least resistance, and are consequently most frequent on flat and low ground. Detailed isobaric charts, with isobars for two-hundredths of an inch were prepared for 9 A.M. and 9 P.M. each day for the month of June, 1888. An examination of these charts showed that instead of the pressure being so very ill-defined, as appeared on the daily weather charts, there are frequently a number of small, but distinct areas of low pressure, or cyclones, with regular wind circulation; and that these small cyclones passed over the districts from which thunder-storms were reported. Sometimes it is not possible to make out well-formed areas of low pressure from two-hundredths of an inch isobars, but there is a deflection of the wind which shows that there is some disturbing cause; and thunder-storms have usually occurred in that immediate neighborhood. The author believes that the thunder-storm formations are small atmospheric whirls, in all respects like ordinary cyclones; and that the whirl may vary from 1 mile to 10 miles or more in diameter. There are frequently several whirls near together, or following one another along the same track. The numerous oscillations in the barometric curve are evidently due to the passage of a succession of atmospheric whirls; and it appears that lightning-strokes are most frequent when these oscillations are numerous. Mr. F. J. Brodie read a paper "On the Prevalence of Fog in London during the Twenty Years 1871 to 1890." The popular notion that November is *par excellence* a month of fog is not confirmed by the figures given by the author. The number of fogs in that month is, if anything, slightly less than in October or January, and decidedly less than in December, the last-mentioned month being certainly the worst of the whole year. The latter part of the winter is not only less foggy than the earlier part, but is clearer than the autumn months. In February the average number of days with fog is only 6.6, as against 8.9 in January, 10.2 in December, 9 2 in October, and 8.8 in November.

— A paper on "Siouan Onomatopes," by J. Owen Dorsey, was read before the Anthropological Society of Washington, D.C., Dec. 1, 1891. According to "The Century Dictionary," "an onomatope is a word formed to resemble the sound made by the thing signified." Mr. Dorsey finds in the Siouan languages many onomatopetic roots, hence he suggests the modification of the definition just given, making it read, "An onomatope is a word *or root* formed to resemble the sound made by the thing signified" In the paper under consideration, the author gives examples of onomatopes in seven languages of the Siouan or Dakotan family: Dhegiha, Kwapa, Kansa, Osage, Tciwere, Winnebago, and Dakota, all but the Dakota having been collected by himself since 1871. In these languages, according to the author, there are sundry permutations of sound, among which are *sh* and *kh*, *gh* and *z*, *dh* and *n*. The words in which these permutations occur are not always synonyms; but when we find a word in which, for example, *sh* is used, we may safely infer that the language contains another word differing from the former only in the substitution of *kh* for *sh*, or that one language or dialect uses *sh* where another employs its correlative, *kh*. Most of the onomatopes found by the author are dissyllabic, a few being monosyllabic and polysyllabic. Some of the onomatopes were given with the notations of their respective sounds as they appear to the Indian ear; thus, the sound of the plane and drawing-knife (*s-s-s*) becomes the root *s'u*; whence the verbs, *ba-s'u*, to use a plane; and *dhi-s'u*, to use a drawing-knife. The sound of a waterfall, of sawing wood, etc., is *kh* + (a prolonged sound), the onomatope being *khu'-'e* in Dhegiha, *khu'-wa-d^{ah}e* in Kansa, *khu'-we* in Kansa and Osage, *kho'-kh'e* in Tciwere, and *sho* + *kh* in Winnebago (the *o* in the last being prolonged). The creaking of new shoes or the sound of fiddle-strings (*gi-gi-gi*) evidently suggested the root *gi'-ze;* whence *ba-gi'ze*, to play a fiddle; and *nan-gi'ze*, to make (new shoes) creak by walking (in them). Many other examples were given; but the reader is referred to the *American Anthropologist* for January, 1892, for the full article.

— Among the recent appointments of Johns Hopkins graduates are Alfred Bagby, Jun. (Ph.D., 1891), adjunct professor of ancient languages, South Carolina College; Edward A. Bechtel (A.B, 1888), professor of Latin, Yankton College, South Da-

kota; Hiram H. Bice (A.B., 1889), instructor of languages, Blackburn University, Carlinville, Ill.; Richard N. Brackett (Ph.D., 1887), associate professor of chemistry, Clemson Agricultural College, S.C.; J. Douglas Bruce (graduate student, 1889–90), associate in Anglo-Saxon and Middle English, Bryn Mawr College; Norman W. Cary (graduate student, 1889–91), instructor in biology, geology, and astronomy, Wilson College, Chambersburg, Pa.; Frank A. Christie (fellow, 1885–86), lecturer on New Testament literature, Harvard Divinity School; Henry L. Coar (graduate student, 1884–86), mathematical master, Smith Academy, Washington University, Mo.; Charles Edward Coates, Jun. (A.B., 1887, Ph D., 1891), professor of chemistry, St. John's College, Md.; John R. Commons (graduate student, 1888–90), associate professor of political economy, Oberlin College; Starr W. Cutting (graduate student, 1890–91), professor of French and German, Earlham College; L. Bradley Dorr (A.B., 1890), adjunct professor of chemistry, Niagara University, Buffalo, N.Y.; Hermann L. Ebeling (A.B., 1882, fellow, 1890, Ph.D., 1891), professor of Greek, Miami University; William A. Eckles (graduate student, 1889–91), professor of Greek, Ripon College; George S. Ely (fellow, 1881–83, Ph.D., 1883), principal examiner, U. S. Patent Office; Alfred Emerson (fellow, 1882–84, instructor, 1884–85), associate professor of classical archæology, Cornell University; Andrew Fossum (Ph.D., 1887), classical instructor, Drisler school, New York City; William R. Fraser (graduate student, 1888–91), instructor in classics, University of Nebraska; Thomas P. Harrison (fellow, 1890-91, Ph.D, 1891) associate professor of English, Clemson Agricultural College, S.C; Arthur S. Hathaway (fellow, 1882–83), professor of mathematics, Rose Polytechnic Institute; George A. Hench (fellow, 1888–89, Ph.D., 1889), assistant professor of Germanic philology, University of Michigan; Charles C. Henschen, (graduate student, 1890–91), instructor in Girard College, Philadelphia; Benjamin C. Hinde (graduate student, 1888–90), professor of physics, Trinity College, N.C.; Clifton F. Hodge (fellow, 1888–89, Ph.D., 1889), instructor of biology, University of Wisconsin; Walter J. Jones (A.B., 1888, Ph.D., 1891), professor of chemistry, Wittenberg College, O.; Henry W. Keating (A.B., 1891), principal, Centreville Academy, Md.; Andrew C. Lawson (fellow, 1886–87, Ph.D., 1888), assistant professor of geology and mineralogy, University of California; Frederick S. Lee (fellow, 1884–85, Ph.D., 1885), demonstrator of physiology, College of Physicians and Surgeons, N.Y.; Felix Lengfeld (fellow, 1887–88, Ph.D., 1888), instructor in chemistry, University of California; A. Stanley Mackenzie (fellow, 1890–91), lecturer in physics, Bryn Mawr College; Arthur W. McDougall (A.B., 1891), financial secretary, Associated Charities of Cincinnati; John H. T. McPherson (A.B., 1886, fellow, 1889–90, Ph.D., 1890), professor of history, University of Georgia; W. Howard Miller (A.B., 1888), instructor in mathematics, Leland Stanford University; Thomas H. Morgan (fellow, 1889–90, Ph.D., 1890, Bruce fellow, 1890–91), associate professor of biology, Bryn Mawr College; Wilfred P. Mustard (fellow, 1890-91, Ph.D., 1891), professor of Latin, Colorado College; Charles A. Perkins (fellow, 1883–84, Ph.D., 1884), professor of physics, Hampden Sidney College; E. D. Preston (fellow, 1876–78), is engaged at Honolulu, probably for a year, working under the joint auspices of the International Geodetic Association of Europe and the U. S. Coast and Geodetic Survey; Herbert E. Russell (graduate student, 1886–87), associate professor of mathematics and natural sciences, University of Denver; A. Duncan Savage (fellow, 1876–79), instructor in the history of art, Farmington, Conn.; Edward M. Schaeffer (graduate student, 1883–85), professor of physical culture, Washington and Lee University; Henry Sewall (fellow, 1878–79, associate, 1879–82, Ph.D., 1879), professor of physiology, University of Denver; Sidney Sherwood (Ph.D., 1891), instructor in finance, University of Pennsylvania; Ernest G. Sihler (fellow, 1876–79, Ph.D., 1878), professor of ancient languages, Concordia College, Milwaukee; Henry D. Thompson (fellow, 1886–87), assistant professor of mathematics, Princeton College; William L. Weber (graduate student, 1890–91), professor of English, Southwestern University, Texas; Benjamin W. Wells (fellow, 1881), professor of modern languages, University of the South; John White, Jun. (A.B., 1888, fellow, 1890–91, Ph.D., 1891), assistant in chemistry, Cornell University; Henry V. Wilson (A.B., 1883, fellow, 1887–88, Ph.D., 1888, Bruce fellow, 1888–89), professor of biology, University of North Carolina; Edmund B. Wilson (fellow, 1879–80, Ph.D., 1881, assistant, 1881–82), adjunct professor of biology, Columbia College; John R. Wightman (fellow, 1886–87, Ph.D., 1888), associate professor of romance languages, University of Nebraska; Arthur C. Wightman (fellow, 1887–88, Ph.D., 1889, demonstrator, 1889–90), assistant professor of biology, Randolph Macon College.

— Professor Stas, the eminent Belgian chemist, has died at the age of seventy-eight.

— According to information sent to Berlin, says the *Times*, Emin Pasha and Dr. Stuhlmann, travelling in the region between Lakes Victoria, Tanganyika, and Albert Edward, have discovered what they take to be the ultimate source of the Nile. This is a river called Kifu, which is supposed to have its sources in the Uhha country, lying to the east of the northern part of Lake Tanganyika, about 4° of south latitude. It flows into the southern end of Lake Albert Edward. It is not stated that Emin and Dr. Stuhlmann have actually followed the course of the river. They have no doubt encountered it on their journey from Victoria Nyanza towards the other lake and followed it down to its mouth. If the course which they lay down for it is correct, it will compel us to alter the hydrography on our maps of this region. There is no mention of the Lake Kifu, between Tanganyika and Albert Edward, to be found in existing maps; and it is well known that the African natives rarely distinguish between a river and a lake,—Nyanza, in the language of Central Africa, standing for both. The still larger lake, Akanyaru, or Alexandra Nyanza, as Mr. Stanley named it, may very probably also have to be removed. No white traveller, so far as is known, has ever seen it; Mr Stanley placed it down on his map from native report. It may simply be an expansion of the Kifu, and not the source of the Kagera, which flows into the west side of Victoria Nyanza. The Kagera will thus lose much of its importance as a remote feeder of the Nile, and the Kifu may possibly become its most southerly source. But it should be remembered that when Mr. Stanley was marching northwards to the Victoria Nyanza in his great journey across Africa, he came upon a river in about 5° south latitude which he believed flowed into the south shore of the lake under the name of Shimeeyu. Mr. Stanley struck this river at only one or two points, and these may really have belonged to different rivers. At all events, on the most recent maps the Shimeeyu is sharply deflected to the east from its mouth in the lake, and there is no river rising in 5° south latitude, which flows into the Victoria Nyanza. Probably we have not heard the last word about the ultimate sources of this strange river, about the position of which Ptolemy, after all, was not so far wrong. We have first the Kifu rising in about 4° south latitude, running into Lake Albert Edward, issuing thence as the Semliki, and feeding Lake Albert. There it mingles with the Victoria Nile from Lake Victoria, and together they issue from Lake Albert as the White Nile, which, before it reaches Khartoum, is augmented by a multitude of tributaries from the west. Whether the Shimeeyu or the Kifu be its most remote southern feeder, the river flows through 36 degrees of latitude. The full details of this journey of Emin will be awaited with interest, especially if he continues to fill in the blanks on our maps and to complete our knowlege of one of the most remarkable rivers of the world.

— Professor Thomas F. Hunt of the Pennsylvania State College has accepted the invitation to occupy the chair of agriculture in the Ohio State University after Jan. 1, 1892.

— Dr. E. von Esmarch, son of Professor v. Esmarch of Kiel, has been appointed professor of hygiene in the University of Königsberg, in the room of Professor C. Fränkel, who has gone to Marburg.

— Mr. Robert P. Bigelow (S B., Harvard University, 1887) has been appointed to the Adam T. Bruce fellowship in biology, in place of Dr. Thomas H. Morgan, who has resigned the fellowship to accept the position of associate professor of biology at Bryn Mawn College.

SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

THE KLAMATH NATION.

I.—THE COUNTRY AND THE PEOPLE.

"THE Klamath Indians of South-Western Oregon" is the second title of the recently published work, by Albert Samuel Gatschet, which forms, according to its leading title, Vol. II. of "Contributions to North American Ethnology," one of the several series of works issued by the "United States Geographical and Geological Survey of the Rocky Mountain Region, J. W. Powell in Charge." The term "volume," however, is in this case to be understood in a special sense. The work really appears in two substantial tomes in quarto, comprising over seven hundred pages each, and distinguished as Parts I. and II. The too brief "table of contents" informs us that Part I. contains the writer's "letter of transmittal," and an "ethnographic sketch," with "texts," and "grammar;" while Part II. is entirely occupied by the "Dictionary — Klamath-English, and English-Klamath." This curt statement gives but a slight idea of the importance of the work as a contribution of the first order to ethnological science.

The Klamath River rises in the southern interior of Oregon, at a distance of about three hundred miles from the Pacific. First traversing an extensive morass, known as Klamath Marsh, it passes through Upper Klamath Lake, a charmingly picturesque sheet, some twenty-five miles long by five or six miles in breadth; then receiving a tributary from the Lower Klamath Lake, it crosses the State boundary into California, and, after a winding course of two or three hundred miles, falls into the ocean near the north-eastern angle of that State. Several tribes of different lineage and languages dwell, or formerly dwelt, along this stream, and have borne indiscriminately from the river's name (the origin and meaning of which are uncertain) the appellation of Klamath Indians But this designation is more usually restricted to the people who possess the upper waters of the river and the great Klamath Lake, and who, as is the case with many other Indian tribes, have no special distinguishing name for themselves except that of "man,"— in their language, *Maklaks*. Another name which has been given to them is *Lutuami*, meaning Lake Indians, which is in no way distinctive. The author has therefore judiciously decided to retain the usual appellation, "the Klamath Indians," adding the description "of South-western Oregon," to distinguish them from the Californian Klamaths. As these, however, have their proper tribal names of Shasti, Karok, Hupa, and Yurok or Alikwa, it is likely that the designation of Klamath will in time be wholly restricted to the Oregon nation bearing this name.

The title of "nation" is one which, as the author suggests in his "letter of transmittal" to Major Powell, may properly be conferred upon this remarkable people. Their claim to this title does not reside in their numbers, which at present hardly reach nine hundred souls, nor in their territory, though this, even in their diminished reservation, covers fifteen hundred square miles. But they have the distinction, like the Basques of south-western Europe, of composing a separate "stock," possessing a language, a mythology, and a social system peculiar to themselves. Such a stock, inhabiting a compact territory, and having (as the Klamaths had till lately) their own government, may justly claim to be considered a nationality. The claim, however, is in America not so notable as it would be deemed in Europe, where distinct linguistic stocks are so few. Mr. Gatschet gives a list of twenty-two of these stocks, radically distinct in grammar and vocabulary, which have been found in Oregon and California alone. If to these we add the stocks of Washington State and of British Columbia, the number of such aboriginal nations found along the Pacific coast of North America will not be less than twenty-eight, nearly equalling the total number of stocks in Asia and Europe combined. There is reason to believe that a careful study of the immensely varied languages, physical and moral traits, mythologies, and social systems of these twenty-eight primitive nationalities would greatly modify and in some respects transform the sciences of ethnology and linguistics. There have been many partial and fragmentary attempts at such a study, some of them possessing much value. But that of Mr. Gatschet is undoubtedly the fullest and most minutely accurate that has thus far been made of any single stock.

The Klamath country is a region of mountains, lakes, and upland plains, stretching eastwardly into the interior from the lofty "Cascade Range," and elevated from four to seven thousand feet above the level of the sea. The author was naturally reminded of his native Switzerland by the grandeur of the scenery in the western portion of the reservation, "where the towering ridge of the Cascade Mountains and the shining mirrors of the lakes at their feet confront the visitor, surprised to see in both a reproduction of Alpine landscapes in the extreme west of America." It might be added that in the people themselves we recognize the well-known traits of mountaineers, as we trace them from the Scottish Highlands to Montenegro, and from the Caucasus to the Pamir,— the intense local attachment, the spirit of independence, the desperate bravery in the defence of their homes, the frugality, and the strong conservatism.

The Klamath people are divided into two septs, the Klamath Lake tribe, who call themselves Eukshikni ("of the lake") and the Modocs, who twenty years ago acquired a dismal notoriety by the "tragedy of the Lava Beds,"— an event, or series of events, which aroused horror at the time, but in which, according to the judgment of the best-informed historians, including Mr. Gatschet, they were more sinned against than sinning. An eminently fair-minded historical writer, Mr. J. P. Dunn (author of "The Massacres of the Mountains"), in his account of the Modoc outbreak, gives a pithy and graphic description of this sept, in terms which,

with some modification, will apply to the whole nation. "They were a peculiar people; good-natured as a rule, but high-tempered; industrious, and yet as haughty as the laziest Indians on the continent. They had more of that commendable pride which makes men desire to be independent and self-respecting than any of their neighbors. They were inclined to be exclusive in their social relations, but even among themselves there was little merrymaking. They took a more serious view of life and its duties. Stubbornness and strong will were tribal characteristics. In features they were rugged and strong, the cheek-bones large and prominent, the hair thick and coarse, the face heavy and not much wrinkled in old age." Of their congeners, the "Upper Klamaths," the same writer says, "They were a finely formed, energetic, and cleanly race." Mr. Gatschet confirms in general these descriptions, but adds: "The Mongolian features of prognathism and of high cheek-bones are not very marked in this upland race, though more among the Modocs than in the northern branch. If it were not for a somewhat darker complexion and a strange expression of the eye, it would be almost impossible to distinguish many of the Eukshikni men from Americans." Their complexion is so nearly white that "blushing is easily perceptible, though the change in color is not great." The hair is straight and dark; and he remarks, "I did not find it very coarse, though with many Modoc women it is said to be so, and to grow to an extreme length."

It is worthy of note that the complexion and other physical characteristics of the Indians of western America vary in marked connection with the "environment," that is, with the climate, food, and mode of life. The natives of northern British Columbia, the Thlingits (or Thlinkeets) and Haidas, are as light of hue as Europeans. They often have ruddy cheeks, brown or blue eyes, and red or brown and wavy or curly hair. As we pass southward along the coast, successively to the Nootkans, the Chinooks, and the other tribes of southern British Columbia, Washington, Oregon, and northern California, we find the hue of the skin deepening, the eyeballs darkening, and the hair becoming coarser, until at length, under the tropical heats of central and southern California we come to tribes with almost negroid traits. These traits are described by the best authority, Mr. H H. Bancroft, as "a complexion much darker than that of the tribes further north, often very nearly black;" "matted bushy hair;" "a low, retreating forehead, black, deep-set eyes, thick, bushy eyebrows, salient cheek-bones, a nose depressed at the root and somewhat wide spreading at the nostrils, a large mouth, with thick, prominent lips, teeth large and white, but not always regular, and rather large ears." But when we recede from the low, hot, and moist coast to the cool and dry interior uplands, the people, as in the case of the Klamaths, return to the European type. Mr. Gatschet describes particularly the small mouth of the Eukshikni, the good teeth, and the genuine Grecian profile, "the nasal ridge not aquiline but strong, and forming an almost continuous line with the forehead."

The truth is that, as one of the acutest of German anthropologists, Oscar Peschel, in his able and comprehensive treatise on the "Races of Man," has affirmed, all attempts to distinguish the various so-called races by merely physical characteristics, whether of color, hair, or the osseous framework, have proved utterly futile. As regards the shape of the head, on which so much stress has been laid, the view maintained by the late S. G. Morton, that the natives of this continent had a peculiar form of cranium, different from that of any other people, has been shown, first by Sir Daniel Wilson in his "Prehistoric Man," and later by Dr. Virchow, in his recent work, "Crania Ethnica Americana," to be wholly incorrect. Dr. Virchow declares (in his summary read before the Congress of Americanists, at Berlin, in 1888) that he finds dolichocephalic, mesocephalic, and brachycephalic tribes scattered throughout the continent; and he pronounces in positive terms his conviction that "the cephalic index, calculated on measures of the length and breadth of the cranial vault, should not be admitted as a determining proof of the single or diverse origin of populations."

We may confidently anticipate that the series of physical measurements of all the American tribes, which, by a happy thought, Professor Putnam has instituted for the Columbus World's Fair, and on which many observers are now engaged, under the experienced supervision of Dr. Franz Boas, will result in confirming the views of Peschel, Wilson, and Virchow, and establishing the truth that physical characteristics afford no proper tests of racial affinity or diversity. We are thus brought back to the older, and, as time has proved, the infinitely stronger evidences of what may be styled the intellectual characteristics, language and mythology. That these tests sometimes fail, through mixture of stocks and adoption of foreign beliefs, is unquestionable; and we are then left in ethnology, as we are often left in other sciences — astronomy, geology, and physiology, for example — to rely on probabilities. But so far as certainty is attainable, as it often is, it can only be attained through the evidence of these special tests.

The language and mythology of the Klamath nation are of a highly interesting character; but our study of these subjects, with the ample materials and philosophic suggestions furnished by Mr. Gatschet, must be left for other articles.

HORATIO HALE.

Clinton, Ontario, Canada.

ANOTHER RIVER-PIRATE.

IN *Science*, vol. xiii., 1889, p. 108, under the title of "A River-Pirate." Professor W. M. Davis described a recent case of river capture in south-eastern Pennsylvania, brought about by the backward gnawing of one stream into the drainage area of another. In looking over with him the Doylestown sheet of the Pennsylvania Topographic Survey there were found numerous cases of similar capture, either already accomplished or about to take place, and at his suggestion the writer recently made a visit to the district in question, in the hope of being able to add something more to the history of the rivers of Pennsylvania.

The region of these migrations, Buck County, is situated in the north-eastern part of Pennsylvania (see Fig. 1), and extends for thirty-three miles (in a straight line) along the Delaware River. It is a gently rolling, well-cultivated country, composed of Mesozoic new red sandstones and shales, dipping from 5° to 15° to the north-west, the hard and soft layers of reddish sand and mud alternating. The evidence goes to show that the surface of the country has been reduced by erosion at least 1,000 feet since the time when the beds were laid down, for the upper deposits must have once overspread the gneiss ridge at the northern county line. They still rise nearly to its top, and there is no evidence of a fault, the absence of any trace of it being capable of explanation only on the supposition that extensive erosion has taken place.[1]

[1] 2d Geol. Survey of Penn. 1885.

The evidence from New Jersey and Pennsylvania goes to show that after the tilting of the sandstones there came an extensive period of denudation, which resulted in the production of a more or less perfect plain, the so-called Cretaceous base-level, which can be seen in the level tops of the New Jersey Highlands and of the ridges of Pennsylvania. Following this came an elevation, giving the streams renewed energy, and resulting in the etching out of the softer rocks down to another peneplain, the Tertiary base-level. Finally another elevation gave the streams another period of activity, and it is in this cycle that we find them to-day. The larger streams, like the Delaware, have already sunk

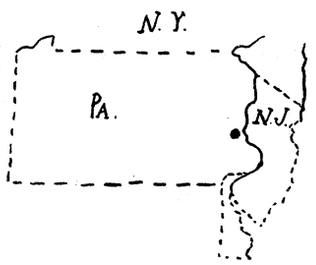

FIG. 1.

their channels well into the Tertiary peneplain. It is with some of the smaller ones that we have now to deal.

Unless something had occurred to interfere with their work in the previous cycle, which ended in the production of the Tertiary peneplain, the streams of this district should now be well adjusted to the structure. On examining the map, however, we find that many of them show a tendency to deflect downstream as they run towards the Delaware. Such an arrangement is characteristic of the tributaries of flood-plained master-streams, as is well shown in the case of the Mississippi and the Po, and may perhaps be explained in this case by the flood plaining of the Delaware during the Tertiary period of base-levelling. Had such a flood-plaining occurred before, i.e., during the Cretaceous base-levelling epoch, the side streams would have already become adjusted to the structure, for since Cretaceous time the whole surface of the country has been worn down some hundreds of feet. Flood-plaining such as that believed to have taken place here, seems to be characteristic of large rivers during the last stages of base-levelling, when, with a very gentle slope, they build their deltas up-stream from their mouths, covering the country on both sides with alluvium.[1]

The flood-plaining of the Delaware would give the side-streams a superimposed course on the Tertiary peneplain, and as they cut down through the cover they would find themselves flowing across the outcropping edges of the underlying strata of sandstone and shale. An arrangement of strata such as that here presented gives an admirable field for the adjustment of streams. It can be readily seen that if a side stream works back along the strike of one of these beds, it has, especially if the bed is soft, a much easier course than a stream which has to cross the edges of many hard and soft strata on its way to join the master. Perhaps this may be more easily understood from the accompanying figure (Fig. 2), reduced from the contoured map of the Pennsylvania Geological Survey, representing the district under consideration.

[1] W. M. Davis: "The Geological Dates of Origin of Certain Topographic Forms on the Atlantic Slope of the United States" (Bulletin Geol. Soc. of America, Vol. 2, p. 580); "The Rivers and Valleys of Penn." (Nat. Geog. Mag., Vol. 1, No. 3); "The Geographic Development of Northern New Jersey" (Proc. Boston Soc. Nat. Hist, XXIV., 1889).

In this case Tohickon Creek, only the lower part of which is shown, has its course directly across the strike of the beds down to the Delaware, while Tinicum Creek goes along the strike for some distance and thus has an easier course. The result has been that a branch of the Tinicum has gnawed its way back along the strike until it is now within less than half a mile of the Tohickon. The Tohickon has a descent of somewhat over twenty feet in the first mile from this point, while the branch of the Tinicum falls over eighty feet in the same distance. The distance from the present divide to the Delaware is about eight miles along the Tohickon, and about five miles along the Tinicum. It is seen, then, what an advantage the little branch of the Tinicum has over its larger rival. The region where the contest is going on is just south of the letter *A* in the figure, and as the more favored stream works its way further and further back, the divide will be pushed over the intervening space, and before long the Tohickon will be captured and led out by a shorter and better course through the Tinicum, leaving its lower part, beheaded, to continue its way down the Tohickon valley. The region of the divide is pretty level, being all enclosed by the 300 feet contour, with a slight slope toward the Tohickon, and a greater one toward the Tinicum, and if we get this idea of migration clearly in mind, it seems almost as if we could see the divide moving toward the Tohickon. There are few trees to protect the surface there, and the crops of potatoes and corn which cover the fields give a good opportunity for the rain to carry away the soil.

What is about to take place in the case of the Tohickon, seems to have already happened further to the east. Here again the Tinicum is the pirate. A glance at the figure will make plain the state of the case. If the Tinicum is followed

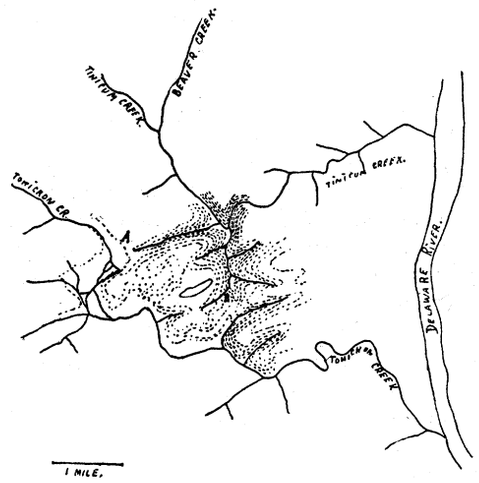

FIG. 2.

down its course to the Delaware it will be seen to make a sharp turn to the north-east just at the point where its pirate tributary comes in from the south-west. Knowing, as we do, that the easier course lies along the strike of the beds and not across it, we naturally turn to this point to see what has taken place. If on coming down the Tinicum to this point we continue to the south, we go for some distance up a small stream flowing north, which comes down to the Tinicum through a deep and rather narrow valley. Continuing our walk along this creek, we soon come to a little sheltered nook, where a picturesque farm-house stands, past which the creek flows, coming in from the south-west. We now leave the latter, and continue up a hollow to the south-east, and across

some fields, gently sloping towards a depression in the middle, until we reach another little creek, flowing south into the Tohickon. The explanation of this seems to be as follows: Beaver Creek originally flowed out to the south-east, across the present divide, into the Tohickon, having a similar course to that of the Tohickon in that it crossed the strike of the beds. Tinicum Creek, gnawing along its easier path, reached and captured Beaver Creek, at the point where the sharp turn is seen. The divide which originally stood close to the Tinicum has now been pushed south until it occupies a position close to the letter *B* in the figure.

The beheaded portion of Beaver Creek still occupies the old valley, while an inverted stream now flows north in a directly opposite direction to that of the original Beaver Creek. The old valley across the divide to the Tohickon is seen as the gentle depression in the fields.

This explanation shows us why there is the sudden turn in the Tinicum just at this point. It has worked back on its easy course until it has captured Beaver Creek, and, as shown above, is continuing its work by pushing back towards the Tohickon, which it will very soon capture in the same way.

R. DeC. WARD.

Harvard College, Oct., 1891.

ASTRONOMICAL NOTES.

M. PALMIERI, director of the Vesuvian Observatory, is responsible for the statement that all the great eruptions of Vesuvius take place at new or full moon, and especially eclipses. The eclipse of June 17, 1890, was accompanied by violent earth currents. On the other hand, Captain de Montessus, who has patiently accumulated observations and data concerning earthquakes, has now a catalogue of more than 60,000 of these phenomena, individually discussed. He establishes that earthquakes are distributed uniformly throughout the day and night, that they have no relation to moon culminations and astronomical seasons, and that such coincidences which have been claimed in the past rest on insufficient ground.

M. Janssen, the eminent French astronomer, has been attempting to find solid rock on the top of Mount Blanc, upon which to build an observatory. His scheme has been to bore galleries through the ice, but so far he has been unsuccessful, and he is considering the feasibility of founding an observatory on the ice.

In the December number of *Knowledge* will be found reproductions of photographs, taken by Dr. Max Wolf of Heidelberg, of the region of the Milky Way in the constellation Cygnus, and also in the constellation Sagitarius. Mr. Ranyard, the editor of *Knowledge*, in an article entitled "Dark Structures in the Milky Way," calls attention to several interesting facts connected with the region of the heavens shown in the photographs. One of the regions covered is that surrounding Alpha Cygnus, and directly above that star is seen a dark, branching, tree-like structure. It evidently corresponds to a branching stream of matter which cuts out the light of the nebulous background on which it seems projected, and it is evidently intimately associated with the lines of stars which border the stream and its branches on either side. A somewhat similar dark branching stream may also be traced on a photograph of the region surrounding Epsilon Cygni, a copy of which appears in the October number of the journal above quoted. Altogether the article, with its attendant photographs, is very interesting, and brings to light some new facts connected with that region of the heavens in which the stars seem almost countless.

The small planet discovered by Dr. J. Palisa of Vienna, on Aug. 30 (now numbered 313), has been named Chaldea.

In a very interesting paper in No. 3,066 of the *Astronomische Nachrichten*, Professor Auwers gives the sun's parallax as 8.880″, with a probable error of ± 0.022″ This value is the result of the determination from the German Transit of Venus expeditions in 1874 and 1882, during which years 754 measurements were made. Professor Harkness, in his discussion of the results of the American Transit of Venus Commission, from the photographs alone, obtained the value 8.842″ for the sun's parallax, with a probable error of ± 0.011″. From a discussion of all the data obtainable, he obtained 8.80905″ ± 0.00567″. This latter value corresponds to a mean distance of 92,796,950 miles from the earth to the sun, while Professor Auwers's value corresponds to a distance of 91,814,000 miles.

The following is a continuation of the ephemeris of Winnecke's comet. The epoch is for Berlin midnight.

1892	R.A. h.	m.	s.	Dec. °	′
Jan. 12	12	28	12	+ 13	38
13		29	8	13	42
14		30	4	13	47
15		30	58	13	52
16		31	53	13	57
17		32	46	14	3
18		33	39	14	9
19		34	31	14	15
20		35	22	14	22
21	12	36	13	+ 14	28

The following is a continuation of the ephemeris of Wolf's comet. The epoch is for Berlin midnight.

1892	R.A. h.	m.	s.	Dec. °	′
Jan. 11	4	16	43	− 13	2
12		17	5	12	54
13		17	29	12	45
14		17	55	12	37
15		18	22	12	28
16		18	51	12	19
17		19	21	12	10
18		19	52	12	1
19		20	24	11	52
20		20	58	11	43
21	4	21	33	− 11	33

G. A. H.

THE GRADUATE STUDENTS' ASSOCIATION OF JOHNS HOPKINS.

THE *Johns Hopkins University Circular* for November gives the names of graduate students in that university from nearly every State in the Union. Nearly all the Canadian provinces and several foreign countries are represented. These three hundred students are here, primarily for hard work, each in his specialty, in one of fourteen departments. Not a few of the students enrolled last year are now studying in European universities, with the expectation of returning to their work here at the beginning of the next year.

There must be departmental isolation in every university, but this may become extreme. The best training for a capable and cultivated manhood can be obtained only as one mingles with his fellows and shares their varied experiences. An organization

which could furnish some tie of social solidarity between students while in residence here, and bring the men into easy communication with universities when abroad. has been lacking. This want, felt by the graduates and some members of the faculty, led to the formation, May 25, 1891, of the Graduate Students' Association. Similar associations have been formed in the universities of Edinburgh, Paris, and in other European universities.

The specific purposes of the association may be gathered from the resolutions passed at the first mass-meeting, from the constitution adopted Oct. 17, and from the reports of the various committees. All of these are freely used in the preparation of the present statement.

Any graduate student may become a member of the association on signing the constitution and paying a small annual fee.

The honorary members consist of the members of the faculty, all past members of the association, and of such distinguished men at home or abroad as may be elected to honorary membership at the yearly meeting of the association.

The functions of the association are comprised in the divisions: international, national, and local or social. The committee on international relations furnish students going abroad with letters of introduction to similar associations in foreign universities, and receive students with letters from like associations of foreign universities. National functions are carried out by a committee who strive to promote intercourse with colleges and universities in the United States and present the advantages of this university to students who contemplate graduate work. This committee has charge of university extension in Baltimore. The social committee receive new students, acquaint them with university methods and give other desired information. They are the medium for co-operation between the faculty and students. They secure any advantages in trade, and adopt such means as may be feasible to promote sociability among the students.

These and other constitutional provisions have been carried out during the present half-year as follows: —

A students' committee, consisting of one from each department, elected by the graduate students of the several departments, was chosen.

The student representatives of the respective departments are: astronomy, Brantz M. Roszel; chemistry, J. E. Gilpin; geology, Francis P. King; biology, R. G. Harrison; physics, George O. Squier; mathematics, E. P. Manning; English, F. J. Mather; history, J. A. James; German, Albert B. Faust; Greek, John H. T. Main; Latin, Sidney G. Stacey; Sanskrit, William W. Baden; romance languages, Julius Blume; Semitic languages, J. D. Prince; pathology, S. Flexner. This general committee, in pursuance of powers granted, elected the association officers and appointed sub-committees for the present year.

The following officers and sub-committees were elected: honorary president, Professor H. B. Adams; president, John H. T. Main; vice-president, W. I. Hull; secretary, R. G. Harrison; treasurer, T. S. Baker; committee on international relations, J. E. Blume, David Kinley, and F. J. Mather; committee on national relations, J. A. James, G. W. Smith, and W. H. Kilpatrick; committee on social relations, R. P. Bigelow, A. B. Faust, S. G. Stacey, U. S. Grant, and J. Blume.

The work accomplished by the committees, although a mere beginning, serves to show that the association has a valuable place in university life. Communication has been entered into with associations of foreign universities. Lectures and courses of lectures have been given by graduate students in the interest of churches and of city associations.

Dr. Walter B. Scaife, a former Hopkins student, by the invitation of Professor Adams, is to give for the benefit of the association an illustrated lecture on "Florence and the Florentines." This lecture is to be given in Levering Hall and followed by an assembly in the parlors. This meeting will be the first of a series of social gatherings to take place during the year.

Through these means it is believed that departmental isolation will be overcome; that men may, through this association, enter into a broader student life, and that the university at large will be convinced of the need for wider social relations than are found in the laboratory or seminary.

JOHNS HOPKINS MARINE LABORATORY.

THE following report of the 1891 session of the Marine Zoological Laboratory has just been made to the president of the Johns Hopkins University.

Early in May, 1891, some of the members of our party went to Jamaica, which had been selected as our field of work for the season, while others joined us later on.

Our party was as follows: W. K. Brooks, director; E. A. Andrews, associate in biology; R. P. Bigelow, graduate student in biology; J. P. Campbell, professor of biology, Athens, Georgia; G. W. Field, graduate student in biology; J. C. Gifford, special student in pathology; R. G. Harrison, H. M. Knower, and M. M. Metcalf, graduate students in biology; T. H. Morgan, Adam T. Bruce fellow; G. C. Price, graduate student in biology; John Stuart, teacher of science, Hope School, Jamaica; Charles Taylor, Kingston, Jamaica; B. W. Barton, lecturer in botany; Basil Sollers, teacher, Baltimore. The two last named devoted themselves to botanical exploration and study in the interior of the island, and they did not visit the laboratory at the seashore.

After a preliminary exploration of different seaports, we selected Port Henderson as our station. This is a seaside resort in Kingston Harbor, opposite Port Royal, and about nine miles by water from Kingston. Here we found two partially furnished houses suitable for a laboratory and lodgings, and we rented and occupied them for about fourteen weeks, from May 26 to Sept. 1.

The establishment of a party in a new home at a remote point in a strange country is a task which, in the mid-summer climate of the tropics, is most severe and exhausting. Of this, I was entirely relieved by Dr. Morgan and Mr. Bigelow, who themselves attended to all the preliminary work with great efficiency, and I take this opportunity to thank them for their willing help, which contributed in no small degree to the success of our expedition.

Our summer was devoted, in great part, to the collection and preservation of material for embryological work at home, and, as the members of the party are still employed in preparing and studying it, the results are not yet far enough advanced for reporting. There are a few noteworthy points of interest, however. Among them are the following: —

Soon after we settled at Port Henderson, Mr. Field found near our laboratory, in an enclosed lagoon of dense salt water, a very remarkable rhizostomatous medusa belonging to the genus Cassiopea. No special of this genus, as limited by Haeckel, has heretofore been found anywhere in the Atlantic. It is a South Pacific form, and the known species are from this region or from the Indian Ocean and the Red Sea. A species of a closely related genus, Polyclonia frondosa, was found by L. Agassiz on the coast of Florida, and was referred by him to the genus Cassiopea, although it is not a true Cassiopea. Polyclonia frondosa is found in Jamaica also, and we obtained specimens in Port Royal Harbor. It is also found in the Bahamas, and Professor H. V. Wilson has given to me the notes and drawings which he made from specimens which he obtained at Green Turtle Kay.

The medusa which we found at Port Henderson is not a Polyclonia, but a true Cassiopea, and the only one as yet found in the Atlantic. As it is very abundant and conspicuous, its escape from the notice of naturalists for such a long time is remarkable, for it is so well known to the negro fishermen of Jamaica that they have a name for it — the Guinea corn blubber. As it is one of the most common and characteristic marine animals of these waters, I have proposed to call it, after the Indian name of the island, Cassiopea Xamacha. While it is able to swim slowly by the pulsations of its bell, it is usually found fixed upon the smooth chalky bottom by the flat sucker-like surface of its exumbrella, and in some places the bottom was so completely covered with them that their circular discs were actually touching each other, while the interspaces were filled in by smaller specimens.

Our knowledge of the life history of the rhizostomatous medusæ is very incomplete, and is based entirely upon the study of the Mediterranean *Colytorhiza tuberculata*, a species which belongs to a more specialized division of the group than Cassiopea, although it was formerly called Cassiopea Borbonica. Many fundamental points in the development of the rhizostomes, and, in

fact, of the Discomedusæ in general, are still in dispute, and at my suggestion Mr. Bigelow undertook to trace the life history of our Cassiopea, a line of research for which the studies which he has pursued for nearly three years under my direction, on the structure of Discomedusæ, rendered him well qualified. He found the larvæ of Cassiopea on marine plants among the adults, and as these lived in captivity and set free peculiar planula-like buds, which also lived and grew in small aquaria in the house, he was able to obtain a fairly complete series of young stages. The most interesting results of his study of the living larvæ are the discovery of this peculiar method of budding, and the settlement of the question as to the origin and homology of the sense organs of adult Discomedusæ, which he has proved to be the modified basal portions of certain tentacles of the attached larvæ. This is supplementary to, and in amplification of, Mr. Bigelow's former work on the development of the sense organs in other groups of medusæ. While at Port Henderson he watched the larvæ undergo their metamorphosis, and he made drawings from life of the important stages. He is now completing his work by the study of serial sections of the larvæ, and of the organs of the adult. This work, which is now well under way, gives promise of results of very great interest, and I regard it as a very noteworthy piece of work, as it will be, when completed and published with ample illustrations, a permanent and valuable addition to our knowledge of the medusæ.

As I had hoped to find Chiton with eggs, Mr. Metcalf went to Jamaica prepared to study its development. We found several species of Chiton in great abundance on the rocks at Port Henderson, close to our laboratory. Within a few hours after his arrival he obtained the eggs, and soon had a series of larvæ, at all stages of development, living in the house in small aquaria. He devoted the season to the study of the living larvæ, and to the preservation of material for sections. He is now continuing the work at our laboratory in Baltimore, and he has constructed a series of enlarged models from his sections, to exhibit the process of segmentation of the egg of Chiton.

We found ourselves well placed at Port Henderson for studying the Termites, or so-called white ants, and Mr. Knower, who had at my suggestion prepared himself for this work before leaving Baltimore, spent his summer in observing their habits, and in collecting the eggs and larvæ, as well as the adults of the different castes. He preserved a fine collection of these specimens, for embryological and anatomical work, and he is now engaged in the prosecution of this portion of his research.

Mr. Field continued at Port Henderson the study of the embryology of Echinoderms, upon which he has been engaged for two years past, and he added to his collection the eggs and larvæ of a number of forms of which he previously had no representation.

Mr. Morgan spent a great deal of his time in gathering and studying material bearing on the problem of metamerization in animals, and in this connection he collected the adults and embryos of Chiton, Ophiurans, etc. He also obtained at several places in the interior of the island a number of eggs from a species of tree frog, which has no tadpole stage, but hatches from the egg as a little frog. Some of these were kept in the laboratory in wet moss until they hatched, while others were preserved at successive embryonic stages. He was so fortunate as to obtain a very complete series of stages, and inasmuch as its development has never been studied, there is every reason to hope that most valuable results will be obtained by the thorough study of this material.

Some ten years ago I found at Beaufort an interesting Crustacean, Lucifer, whose metamorphosis is most remarkable and instructive. I obtained a few eggs, and reared the newly hatched larvæ, and traced the metamorphosis with exhaustive minuteness from the time of hatching to maturity; and my results, with ample illustrations, were presented to the Royal Society of London by Professor Huxley, and were published in the Philosophical Transactions. This work, which was among the first fruits of our marine laboratory, is now embodied in all the standard text-books.

I was not able, at Beaufort, to obtain enough eggs of Lucifer to study the embryology, although the few which I did find showed that this part of its life history is fully as important as the metamorphosis. I have been upon the watch ever since for a chance to obtain a supply of eggs, in order to supplement my first memoir on the metamorphosis by a second on the embryology; but while I have occasionally found Lucifer with eggs, out at sea, I have had no opportunity to study it, as the preparation of the material presents such difficulties that it cannot be carried on at sea. The adult animals are so small that they are almost invisible, and the eggs, which are microscopic, are so loosely attached and so delicate, that they are lost in the act of capturing the adults. I was greatly pleased to find Lucifer in abundance, and by going out in a boat and collecting the adults with great care, and taking them carefully home, I was so fortunate as to find some thirty or forty with eggs, and these I kept in aquaria long enough to obtain a tolerably complete series of stages in the embryonic development. I am now engaged in the study of this material, and I hope to have an account of the embryology of Lucifer completed within a year. My success in obtaining these eggs is an ample return for the expedition to Jamaica.

These are some of the subjects upon which we hope to contribute original scientific knowledge, as the result of our summer in Jamaica; but, be ides its value to science, the expedition had very great educational value to all of us. We saw for ourselves an endless variety of most interesting and instructive natural objects, which we had previously known only from books or preserved specimens, and every hour was filled with most delightful experiences of the greatest value to naturalists and teachers of natural science. I am sure that all the members of our party will be glad to join me in expressing our high appreciation of the great advantage which we have enjoyed in the opportunity to spend a summer in laboratory work at the seaside in Jamaica.

After our return to Baltimore, a series of public lectures, illustrated by specimens and photographs, was given by members of the party, under the auspices of the Naturalists' Field Club of the University.

The lectures were as follows: The Aspects of Nature in Jamaica, by W. K. Brooks; the Zoology of Jamaica, by E A. Andrews; the Natural History of Termites, by H. M Knower; the Botany of Jamaica, by B. W. Barton; and the People of Jamaica, by Basil Sollers.

W. K. BROOKS.

AMONG THE PUBLISHERS.

THE "Browning Cyclopædia," which has been in preparation by Dr. Edward Berdoe, author of "Browning's Message to His Time," will be published very shortly by Macmillan & Co. It is probably the most generally useful of all the aids to the study of Browning as yet attempted.

— Ignatius Donnelly's new book will be entitled "The Cipher in the Plays and on the Tombstone." It is to place the truth of the belief in a cipher beyond controversy.

— Mrs. Laurence Gomme is engaged upon a book of children's games, and also upon a volume dealing with the various local feasten and ceremonial cakes, both of which subjects were rather prominent at the recent Folk-Lore Congress.

— T. Y. Crowell & Co. have just issued the fifth and concluding volume of Sybel's work on "The Founding of the German Empire by William I." The volume contains, besides the text, thirty pages of index and ten pages of chronological data.

— "Homilies of Science" is the title of a volume, by Dr. Paul Carus, from the Open Court Publishing Company, consisting of a collection of short editorial articles discussing religious, moral, and social questions from the standpoint of what might briefly be characterized as the religion of science.

— The office of *The Publishers' Weekly* will publish at once a useful hand-book for the bookseller and librarian, entitled "A Bookseller's Library, and How to Use It," by A. Growoll. The volume contains annotated lists of the principal American, English, German, and French book-trade catalogues, trade and literary journals, leading library and auction catalogues, catalogues of dealers in second-hand books with mention of their specialties, etc. These lists are accompanied by concise and practical hints as to how they may best be used, and the volume thus forms a desirable manual, particularly for the young bookseller.

— The *Atlantic Monthly* for January is a very good number. The article in it that is most likely to attract intelligent readers is that on "John Stuart Mill and the London and Westminster Review." Mill was the proprietor of that *Review* from 1836 to 1840, and had as his assistant in the editorship a young Scotchman named John Robertson; and this article consists in the main of letters that Mill addressed to Robertson during those years. The letters are very interesting, not only as revealing certain aspects of Mill's character, but also as showing the care with which he strove to keep the *Review* up to a high standard, and also with what keen intelligence he criticised the articles that were offered for insertion in it. Another article that is sure to attract notice is that on "Boston," by Ralph Waldo Emerson, in which the author traces the historical connection between the character of the early settlers and the moral and intellectual influence of Boston in American life. He justly says that Boston owes her influence to her religious earnestness and her instinct of freedom, and predicts that, so long as she retains these qualities, her influence will continue. This article was written in 1861, but has never before been published. Mr. Henry James contributes some reminiscences of James Russell Lowell, and expresses the opinion that Lowell's influence was mainly due to his style, both in writing and in speech, — a remark that is to a certain extent true, though the faults of Mr. James's own style are such that he is hardly a competent critic. Besides these papers, there are some excellent book-reviews, the beginning of a novel by F. Marion Crawford, and various other articles which we have not space to particularize. The *Atlantic's* programme for 1892 is unusually varied and promising; and the magazine is sure to have interested readers throughout the year.

— *Garden and Forest* for Christmas week contained, as its leading illustration, one of a grove of hemlocks whitened with lately-fallen snow, and in an editorial article the stateliness and grace of this northern evergreen are celebrated. There are pictures, too, of a rare orchid in bloom, and cultural directions for growers of fruit and flowers. Mrs. Robbins gives a sketch of Deering's Woods, Portland, in her New England Park series; Mr. Jack adds some notes on his horticultural tour through Europe, and M. Demontzey tells how he has tamed the torrents of the French Alps by reclothing their basins with growing forests.

— From the D. Van Nostrand Company we have received "How to Become an Engineer," by George W. Plympton (18°, 50 cents). It is a brief treatise on the theoretical and practical training necessary in fitting for the duties of the civil engineer, giving the opinions of eminent authorities on the subject, and indicating the courses of study in engineering usually followed in the technical schools. From the same company has come "The Sextant," by F. R. Brainard (18°, 50 cents), being a treatise on reflecting mathematical instruments, with practical hints, suggestions, and "wrinkles" on their errors, adjustments, and use. To the sextant, the form of reflecting instrument most commonly

used, most of the little volume is devoted. The volume is mainly a compilation of matter on the subject, well selected and judicially worked into shape; to which the author has added many ideas and suggestions of his own and of officers who have been associated with him in the naval service.

— The *Magazine of American History* opens its twenty-seventh volume with the New Year. The leading paper, by Hon. Arthur Harvey, the president of the Canadian Institute, is the first part of "A Critical and Common-sense View of the Enterprise of Christopher Columbus," illustrated. "The Secret Societies of Princeton University," by Thomas Hotchkiss, Jun., illustrates the old and new Whig Halls at Princeton. "A Short-lived American State," is a contribution from the Louisiana historian, Henry E. Chambers. The question, "Was America Discovered by the Chinese?" is discussed by Rev. Dr. Glover. Those who look for the editor's contribution will find it in an account of "Prince Henry the Navigator," the first to conceive the bold project of opening a road through the unexplored ocean, who indeed was the originator of the impulse which sent Columbus subsequently to our shores. "The Scot in America," by Hon. R. S. Robertson, turns the light upon a most interesting race among the founders of America. "A Sketch of John Badollett, 1758–1837," one of Indiana's strong characters in early times, is by President Bryan of Vincennes University. "Letters on Government Making, by Patrick Henry and John Adams, in 1776;" some things about "Collis P. Huntington," by Hubert Howe Bancroft; "Canada from a European Point of View in 1761;" and other short contributions complete the number.

— One of the early issues of D. C. Heath & Co. will be "White's Number Lessons," graded for second and third year pupils. It has been selected from the everyday blackboard work used in the Syracuse schools. It deals with numbers progressively from ten up into the thousands, using easy fractions and Arabic numerals throughout.